METHOD OF GROWING OXIDE THIN FILM

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Abstract

PROBLEM TO BE SOLVED: To provide a method of growing an oxide thin film on a substrate. SOLUTION: In the method of growing an oxide thin film according to the principle of the ALD method where an oxide thin film is deposited onto a substrate by an alternating surface reaction of metallic raw material and oxygen raw material, the oxygen raw material to be used is composed of a compound of boron, silicon or metal having at least one organic ligand, and the oxygen is combines with at least one atom of boron, silicon or metal.

Bibliography.

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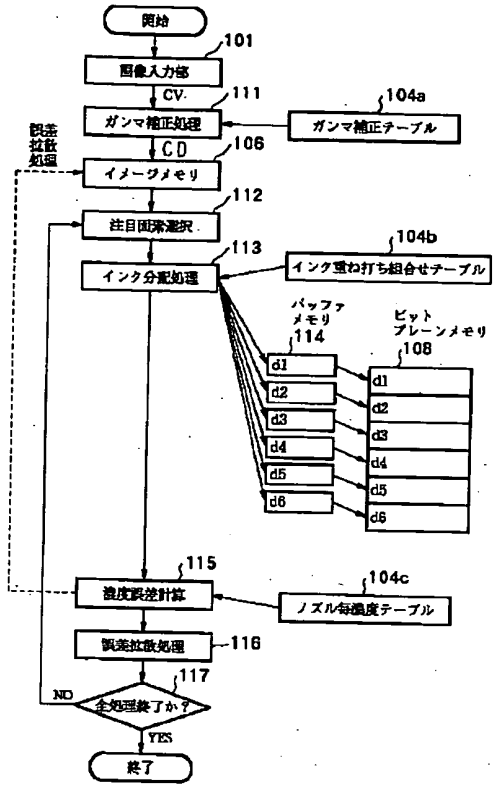
Summary.

(57) [Abstract]

[Technical problem] concentration dispersion for every nozzle -- an amendment -- things are made possible and high-definition image formation is realized

[Means for Solution] It faces recording one pixel by the dot formed in two or more kinds of ink using the recording head which two or more kind ink was made to correspond, and was equipped with two or more nozzle groups which consist of two or more nozzles corresponding to the ink of the same kind, and a concentration table is held the whole nozzle showing the record concentration at the time of making ink breathe out from each of the nozzle which constitutes the nozzle group about two or more nozzle groups with which a recording head is equipped. Determination of the nozzle which should carry out a **** drive about an attention pixel computes the record concentration of the pixel concerned with reference to a concentration table the whole nozzle. And error diffusion process is performed based on the record concentration of the computed pixel, and the record concentration of the pixel concerned shown by image data.

[Translation done.]



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1. This document has been translated by computer.So the translation may not reflect the original precisely.

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3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]

[Claim 1] The ink-jet recording device characterized by providing the following. The recording head containing the nozzle group which consists of two or more nozzles. A storage means to store the concentration table showing the record concentration recorded in the ink breathed out from each of the nozzle which constitutes the aforementioned nozzle group. A determination means to determine the nozzle which should carry out a **** drive in the nozzle which constitutes the aforementioned nozzle group. A concentration compensation means to acquire the aforementioned record concentration corresponding to the nozzle determined that a **** drive should be carried out from the aforementioned concentration table, and to perform the compensatory control of record concentration based on the acquired record concentration with the aforementioned determination means.

[Claim 2] The aforementioned concentration compensation means is an ink-jet recording device according to claim 1 characterized by performing error diffusion process using the difference of the record concentration acquired from the aforementioned concentration table, and the record concentration which the aforementioned image data directs.

[Claim 3] A pattern record means to use the aforementioned nozzle group for the predetermined field on a record medium, and to record a predetermined pattern, A detection means to detect the concentration of each part grade of the pattern recorded with the aforementioned pattern record means, Based on the concentration of each part grade detected with the aforementioned detection means, the record concentration recorded in the ink breathed out from each of the nozzle which constitutes the aforementioned nozzle group is acquired. The ink-jet recording device according to claim 1 characterized by having further a generation means to generate the aforementioned concentration table.

[Claim 4] The ink-jet recording device which is characterized by providing the following and which records one pixel by the dot formed in two or more kinds of ink. The recording head which two or more kinds of ink was made to correspond,

and was equipped with two or more nozzle groups which consist of two or more nozzles corresponding to the ink of the same kind. A storage means to store the concentration table showing the record concentration recorded in the ink breathed out from each of the nozzle which constitutes the nozzle group about at least one nozzle group of two or more nozzle groups with which the aforementioned recording head is equipped. A determination means to determine the nozzle which should carry out a **** drive out of the nozzle of two or more aforementioned nozzle groups based on image data about the pixel which should be recorded. A concentration compensation means carry out the compensatory control of record concentration based on the aforementioned record concentration of the pixel which computed with a calculation means acquires the aforementioned record concentration corresponding to each of the nozzle determined that a **** drive should be carried out with reference to the aforementioned concentration table with the aforementioned determination means, and compute the record concentration of the pixel concerned, and the aforementioned calculation means, and the record concentration by which record of the pixel concerned shown by the aforementioned image data should be made.

[Claim 5] The aforementioned calculation means is an ink-jet recording device according to claim 4 characterized by to compute the record concentration of the pixel concerned by acquiring the record concentration value beforehand defined to each nozzle group when a record concentration value was acquired from the concentration table when the concentration table corresponding to the nozzle group to which the nozzle determined that a **** drive should be carried out belongs exists, and a corresponding concentration table did not exist.

[Claim 6] Two or more aforementioned kinds of ink contains the ink of two or more kinds of ink concentration about the same color. 1 pixel is expressed by many gradation by piling up and recording the ink of the ink concentration of these two or more kinds. the aforementioned storage means A concentration table is stored about two or more nozzle groups which correspond to two or more concentration at least. the aforementioned calculation means The ink-jet

recording device according to claim 4 which gains the record concentration corresponding to each of the nozzle determined to carry out a **** drive with the aforementioned determination means with reference to the aforementioned concentration table, and is characterized by computing the record concentration of the pixel concerned by totaling the gained record concentration.

[Claim 7] The aforementioned concentration compensation means is an ink-jet recording device according to claim 4 characterized by performing error diffusion process using the difference of the record concentration of the pixel concerned obtained by the aforementioned calculation means, and the record concentration which is the pixel concerned which the aforementioned image data directs.

[Claim 8] A pattern record means to record a predetermined pattern on the predetermined field on a record medium using at least one nozzle group in two or more aforementioned nozzle groups, A detection means to detect the record concentration of each part grade of the pattern recorded with the aforementioned pattern record means, Based on the record concentration of each part grade detected with the aforementioned detection means, each record concentration of the nozzle which constitutes the nozzle group used with the aforementioned pattern record means is acquired. The ink-jet recording device according to claim 4 characterized by having further a generation means to generate the concentration table corresponding to the nozzle group concerned.

[Claim 9] The aforementioned determination means is the ink-jet recording device according to claim 6 characterized by to determine the nozzle which should choose the combination of the becoming ink kind and should carry out a **** drive from two or more aforementioned nozzle groups based on a selected combination most closely to the record concentration value as which the record concentration at the time of recording using each ink for every various kinds of the ink of two or more aforementioned kinds of ink concentration assigns, and image data expresses it about the pixel which should record.

[Claim 10] The control method of the ink-jet recording device which records a picture using the recording head containing the nozzle group which is

characterized by providing the following, and which consists of two or more nozzles. The determination process which determines the nozzle which should carry out a **** drive in the nozzle which holds the concentration table showing the record concentration recorded in the ink breathed out from each of the nozzle which constitutes the aforementioned nozzle group, and constitutes the aforementioned nozzle group. The concentration compensation process of acquiring the aforementioned record concentration corresponding to the nozzle determined a **** drive being carried out from the aforementioned concentration table, and performing the compensatory control of record concentration based on the acquired record concentration at the aforementioned determination process.

[Claim 11] The aforementioned concentration compensation process is the control method of the ink-jet recording device according to claim 10 characterized by performing error diffusion process using the difference of the record concentration acquired from the aforementioned concentration table, and the record concentration which the aforementioned image data directs.

[Claim 12] The pattern record process which uses the aforementioned nozzle group for the predetermined field on a record medium, and records a predetermined pattern, The detection process which detects the record concentration of each part grade of the pattern recorded at the aforementioned pattern record process, Based on the record concentration of each part grade detected at the aforementioned detection process, the record concentration recorded in the ink breathed out from each of the nozzle which constitutes the aforementioned nozzle group is acquired. The control method of the ink-jet recording device according to claim 10 characterized by having further the generation process which generates the aforementioned concentration table.

[Claim 13] The control method of the ink-jet recording device which records one pixel by the dot formed in two or more kinds of ink using the recording head which two or more kinds of ink was made to correspond, and was equipped with two or more nozzle groups which are characterized by providing the following, and which consist of two or more nozzles corresponding to the ink of the same

kind. The determination process which determines the nozzle which should carry out a **** drive out of the nozzle of two or more aforementioned nozzle groups based on image data about the pixel which should hold the concentration table showing the record concentration recorded in the ink breathed out from each of the nozzle which constitutes the nozzle group, and should be recorded about at least one nozzle group of two or more nozzle groups with which the aforementioned recording head is equipped. The calculation process which acquires the aforementioned record concentration corresponding to each of the nozzle determined that a regurgitation drive should be carried out with reference to the aforementioned concentration table at the aforementioned determination process, and computes the record concentration of the pixel concerned. The aforementioned record concentration of the pixel computed at the aforementioned calculation process. The concentration compensation process of performing the compensatory control of record concentration based on the record concentration by which record of the pixel concerned shown by the aforementioned image data should be made.

[Claim 14] The aforementioned calculation process is the control method of the ink-jet recording device according to claim 13 characterized by to compute the record concentration of the pixel concerned by acquiring the record concentration value beforehand defined to each nozzle group when a record concentration value was acquired from the concentration table when the concentration table corresponding to the nozzle group to which the nozzle determined that a regurgitation drive should be carried out belongs exists, and a corresponding concentration table did not exist.

[Claim 15] Two or more aforementioned kinds of ink contains the ink of two or more kinds of ink concentration about the same color. 1 pixel is expressed by many gradation by piling up and recording the ink of the ink concentration of these two or more kinds. the aforementioned storage process A concentration table is stored about two or more nozzle groups which correspond to two or more concentration at least. the aforementioned calculation process The control

method of the ink-jet recording device according to claim 13 which gains the record concentration corresponding to each of the nozzle determined to carry out a regurgitation drive at the aforementioned determination process with reference to the aforementioned concentration table, and is characterized by computing the record concentration of the pixel concerned by totaling the gained record concentration.

[Claim 16] The aforementioned concentration compensation process is the control method of the ink-jet recording device according to claim 13 characterized by performing error diffusion process using the difference of the record concentration of the pixel concerned obtained according to the aforementioned calculation process, and the record concentration which is the pixel concerned which the aforementioned image data directs.

[Claim 17] The pattern record process which records a predetermined pattern on the predetermined field on a record medium using at least one nozzle group in two or more aforementioned nozzle groups, The detection process which detects the record concentration of each part grade of the pattern recorded at the aforementioned pattern record process, Based on the record concentration of each part grade detected at the aforementioned detection process, each record concentration of the nozzle which constitutes the nozzle group used at the aforementioned pattern record process is acquired. The control method of the ink-jet recording device according to claim 13 characterized by having further the generation process which generates the concentration table corresponding to the nozzle group concerned.

[Claim 18] The aforementioned determination process assigns the record concentration at the time of recording using each ink for every various kinds of the ink of two or more aforementioned kinds of ink concentration. The combination of the ink kind which becomes the record concentration value which image data expresses about the pixel which should be recorded most closely is chosen. The control method of the ink-jet recording device according to claim 15 characterized by determining the nozzle which should carry out a regurgitation

drive from two or more aforementioned nozzle groups based on a selected combination.

[Claim 19] The information processor which generates the data for a record drive for the recording device which records using the recording head containing the nozzle group which is characterized by providing the following, and which consists of two or more nozzles. A storage means to store the concentration table showing the record concentration recorded in the ink breathed out from each of the nozzle which constitutes the aforementioned nozzle group. A determination means to determine the nozzle which should carry out a regurgitation drive in the nozzle which constitutes the aforementioned nozzle group. A concentration compensation means to acquire the aforementioned record concentration corresponding to the nozzle determined that a regurgitation drive should be carried out from the aforementioned concentration table, and to perform the compensatory control of record concentration to the aforementioned determination means based on the acquired record concentration with the aforementioned determination means. An output means to output the data in which the nozzle determined that a regurgitation drive should be carried out by the aforementioned determination means is shown as data for a record drive.

[Claim 20] The information processor which generates the data for a record drive of ** for the recording device which records using the recording head which two or more kinds of ink was made to correspond, and was equipped with two or more nozzle groups which are characterized by providing the following, and which consist of two or more nozzles corresponding to the ink of the same kind by the dot formed in two or more kinds of ink in one pixel. A storage means to store the concentration table showing the record concentration recorded in the ink breathed out from each of the nozzle which constitutes the nozzle group about at least one nozzle group of two or more nozzle groups with which the aforementioned recording head is equipped. A determination means to determine the nozzle which should carry out a regurgitation drive out of the nozzle of two or more aforementioned nozzle groups based on image data about the pixel which

should be recorded. A calculation means to acquire the aforementioned record concentration corresponding to each of the nozzle determined that a regurgitation drive should be carried out with reference to the aforementioned concentration table with the aforementioned determination means, and to compute the record concentration of the pixel concerned. A concentration compensation means perform the compensatory control of record concentration to the aforementioned determination means based on the aforementioned record concentration of the pixel computed with the aforementioned calculation means, and the record concentration by which record of the pixel concerned shown by the aforementioned image data should be made, and an output means output considering the data the nozzle determined by the aforementioned determination means that a regurgitation drive should be carried out is shown as data for a record drive.

[Claim 21] The information processing method for generating the data for a record drive for the recording device which records using the recording head containing the nozzle group which is characterized by providing the following, and which consists of two or more nozzles. The determination process which determines the nozzle which should carry out a regurgitation drive in the nozzle which stores the concentration table showing the record concentration recorded in the ink breathed out from each of the nozzle which constitutes the aforementioned nozzle group, and constitutes the aforementioned nozzle group. The concentration compensation process of acquiring the aforementioned record concentration corresponding to the nozzle determined a regurgitation drive being carried out from the aforementioned concentration table, and performing the compensatory control of record concentration to the aforementioned determination process based on the acquired record concentration at the aforementioned determination process. The output process which outputs the data in which the nozzle determined that a regurgitation drive should be carried out according to the aforementioned determination process is shown as data for a record drive.

[Claim 22] The information processing method which generates the data for a record drive for the recording device which records using the recording head which two or more kinds of ink was made to correspond, and was equipped with two or more nozzle groups which are characterized by providing the following, and which consist of two or more nozzles corresponding to the ink of the same kind by the dot formed in two or more kinds of ink in one pixel. The determination process which determines the nozzle which should carry out a regurgitation drive out of the nozzle of two or more aforementioned nozzle groups based on image data about the pixel which should store the concentration table showing the record concentration recorded in the ink breathed out from each of the nozzle which constitutes the nozzle group, and should be recorded about at least one nozzle group of two or more nozzle groups with which the aforementioned recording head is equipped. The calculation process which acquires the aforementioned record concentration corresponding to each of the nozzle determined that a regurgitation drive should be carried out with reference to the aforementioned concentration table at the aforementioned determination process, and computes the record concentration of the pixel concerned. The aforementioned record concentration of the pixel computed at the aforementioned calculation process. The concentration compensation process of performing the compensatory control of record concentration to the aforementioned determination process based on the record concentration by which record of the pixel concerned shown by the aforementioned image data should be made, and the output process outputted considering the data in which the nozzle determined that a regurgitation drive should be carried out according to the aforementioned determination process is shown as data for a record drive.
[Claim 23] The storage which stores the control program for making a computer perform the information processing method according to claim 21 or 22.
[Claim 24] The control program for making a computer perform the information processing method according to claim 21 or 22.

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* NOTICES *

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] Especially this invention relates to the ink-jet recording device which can reproduce image data faithfully, and its control method about an ink-jet recording device and its control method.

[0002]

[Description of the Prior Art] In recent years, the performance of an ink-jet recording device improves and not only a text but a picture has come to be recorded by the ink-jet recording device. At the ink-jet recording device, usually is prepared, respectively about the ink of concentration in which the nozzle group which carried out the accumulation array of two or more ink deliveries (nozzle) in which the regurgitation is possible for the ink of the same color same concentration for the improvement in recording rate etc. is used, and still such nozzle groups differ in the same color, and different ink of a color.

[0003] In such an ink-jet recording device, it records by making ink breathe out from a nozzle, moving relatively the head which prepared these nozzle groups to a record medium. The following methods are carried out as a method of moving a head relatively to a record medium.

[0004] ** While the nozzle group has been arranged [abbreviation] in the direction of X and the record medium has stopped Move a recording head in the direction of X, and the direction (the direction of Y) which intersects perpendicularly, and it records in the meantime. Record by repeating operation of recording while making predetermined distance movement of the record medium carrying out in the direction of X intermittently after that and moving a recording head again subsequently to the direction of Y. The so-called full multi-print method recorded while fixing and preparing so that the direction of Y of a medium may cover the so-called swath print method and ** nozzle group by the width-of-face overall length, and moving a medium in the direction of X by constant speed.

[0005] When recording a picture by these methods, a pixel is defined as a unit which constitutes a picture. A pixel does not necessarily restrict consisting of one dot (portion formed on a medium of 1 time of the ink regurgitation from one nozzle), but you may make it form one pixel by two or more dots. the case where it forms by two or more dots -- these dots -- abbreviation -- it may be recorded on the same point in piles, and may be recorded on the adjoining point Anyway, it is determined according to the rule decided beforehand. It is decomposed into a pixel by the image-processing means, and the image data which should be recorded is determined to each pixel by the rule the color which should be recorded, and concentration were beforehand decided to be. Record is performed according to this determination. As mentioned above, since one pixel may consist of two or more dots, the ink of the color in which in that case does not restrict but it differs from one color and one concentration, and different concentration may be chosen.

[0006] When recording a picture, it considers as the method of reproducing the gradation of image information faithfully, and false halftone approaches, such as a dither method and an error diffusion method, are used. Furthermore, in a dither method or an error diffusion method, expression of more gradation is attained by making [many] the gradation with which one pixel can express. The example of

such a record method is indicated by JP,10-324002,A etc.

[0007] That is, the gradation which can express the ink in which concentration differs by this pixel about one color by preparing the nozzle group in which the regurgitation is possible, piling up alternatively and recording within the limit beforehand decided to one pixel from these nozzle groups can be made [many]. For example, supposing it prepares the nozzle group in which the regurgitation is possible for the ink of six kinds of different concentration and constitutes one pixel of 600dpi from less than four heavy records, expression of 50 or more gradation is possible. Furthermore, supposing it constitutes one pixel from the adjoining point 2x2 and constitutes it from less than a total of 16 heavy records, expression of 100 or more gradation is possible.

[0008] The gradation expressed in these cases and the rule to which the method of heavy record of ink is made to correspond are decided beforehand, it is determined when the regurgitation of the ink is carried out by actual record; i.e., which nozzle, according to this rule, and record is performed by actual record control means according to this.

[0009] An example of heavy record of ink is as follows. First, the concentration of the pixel at the time of recording in each ink is measured, the concentration at the time of recording in piles with this measured value is determined, the table which matches each concentration and the combination of an overprint is prepared, and the combination of the overprint of the concentration near the concentration of the portion corresponding to the pixel which should be recorded is chosen from this table. In the case of error diffusion process, the difference of the concentration of a portion and the concentration (concentration obtained by the overprint) of a table corresponding to the pixel which should be recorded is searched for, and it carries out diffusion process by making this into an error.

[0010]

[Problem(s) to be Solved by the Invention] When recording a picture by such method, the discharge quantity of the ink breathed out from one nozzle group does not become fixed strictly according to the reasons of the structure of a head,

the state of ink, the state of a drive of making ink breathing out, etc., although it must originally be regularity. Thus, if it records on discharge quantity using a nozzle with dispersion, an error with the picture which should originally be recorded partially arises, concentration nonuniformity will occur into the portion of concentration uniform originally, or un-arranging [whose portion which should originally be visible buries and is not visible to a noise / of **] will arise conversely.

[0011] The same thing occurs, not only discharge quantity but when saying that the concentration of ink is delicately different with the position of the nozzle in the same nozzle group. Moreover, when becoming a non-dense from predetermined density partially or becoming dense by dispersion in the direction of the regurgitation of the ink from a nozzle, the same problem generates the place which should originally be recorded in an equal pitch.

[0012] For this reason, for example, like a medical picture, when expressing original picture concentration faithfully is called for, trouble will be caused. although recording the picture of monochrome on a medium and observing it is performed by the medical picture -- the reason -- the direction of a monochrome picture -- the concentration of human being's eyes -- resolution is high and it is for the amount of information which human being can recognize to increase furthermore, the concentration which human being can recognize [rather than / which uses the thing of a transparency formula], using the thing of a reflective formula as a record medium -- it is known that resolution will increase the concentration of human being's eye [as opposed to a color picture generally] -- resolution is called 10 or 11 bits about the monochrome transparency picture to being said to be about 8 bits and the thing by which the X-ray photograph and CT-MRI picture of medical application were recorded on transparency media -- setting -- actually -- human being's concentration -- resolution -- it is read to a limit and the information for a diagnosis is offered In the field asked for such high definition, the difference among the above delicate concentration also causes a rough deposit of picture nonuniformity or a picture.

[0013] In order to solve these problems, some ink combination patterns perform beforehand test pattern record by fixed concentration (concentration which should become fixed), the concentration of this test pattern is read with a scanner, and the amendment and the so-called shading compensation are proposed in the image data of the picture which is going to search for and record the concentration dispersion. (In addition, "test pattern record by fixed concentration (concentration which should become)") if the concentration of a record portion is as a design value, it will be the meaning referred to as recording by the concentration which should originally turn into fixed concentration, and will become the concentration shifted for a while according to the error by many factors in fact in that case However, if such a shading compensation is applied to the above record methods which constitute many pixels by heavy record The number of combination patterns becomes huge and processing becomes complicated (for example, the combination pattern which allows duplication and chooses a maximum of four kinds from six kinds of different concentration is generated). Moreover, an amendment is needed again about the rectified concentration an amendment and shortly, and the case where it is not strictly completed by amendment comes out of the image data of the picture of a basis.
[0014] this invention is made in view of the above-mentioned problem -- having -- concentration dispersion for every nozzle -- an amendment -- it aims at making things possible and making high-definition image formation possible
[0015] furthermore, heavy record of two or more kinds of ink -- a pixel -- constituting -- a picture -- recording -- setting -- concentration dispersion for every nozzle -- an amendment -- it aims at making high-definition image formation possible by making things possible
[0016]
[Means for Solving the Problem] The ink-jet recording device by this invention for attaining the above-mentioned purpose is equipped with the following composition. Namely, the recording head containing the nozzle group which consists of two or more nozzles, A storage means to store the concentration

table showing the record concentration recorded in the ink breathed out from each of the nozzle which constitutes the aforementioned nozzle group, A determination means to determine the nozzle which should carry out a regurgitation drive in the nozzle which constitutes the aforementioned nozzle group, It has a concentration compensation means to perform the compensatory control of record concentration based on the record concentration which acquired the aforementioned record concentration corresponding to the nozzle determined that a regurgitation drive should be carried out from the aforementioned concentration table, and was acquired with the aforementioned determination means.

[0017] Moreover, the ink-jet recording device by other modes of this invention for attaining the above-mentioned purpose is equipped with the following composition. Namely, it is the ink-jet recording device which records one pixel by the dot formed in two or more kinds of ink. The recording head which two or more kinds of ink was made to correspond, and was equipped with two or more nozzle groups which consist of two or more nozzles corresponding to the ink of the same kind, A storage means to store the concentration table showing the record concentration recorded in the ink breathed out from each of the nozzle which constitutes the nozzle group about at least one nozzle group of two or more nozzle groups with which the aforementioned recording head is equipped, A determination means to determine the nozzle which should carry out a regurgitation drive out of the nozzle of two or more aforementioned nozzle groups based on image data about the pixel which should be recorded, A calculation means to acquire the aforementioned record concentration corresponding to each of the nozzle determined that a regurgitation drive should be carried out with reference to the aforementioned concentration table with the aforementioned determination means, and to compute the record concentration of the pixel concerned, It has a concentration compensation means to perform the compensatory control of record concentration based on the aforementioned record concentration of the pixel computed with the aforementioned calculation

means, and the record concentration by which record of the pixel concerned shown by the aforementioned image data should be made.

[0018] Moreover, the information processor by this invention for attaining the above-mentioned purpose is equipped with the following composition. Namely, it is the information processor which generates the data for a record drive for the recording device which records using the recording head containing the nozzle group which consists of two or more nozzles. A storage means to store the concentration table showing the record concentration recorded in the ink breathed out from each of the nozzle which constitutes the aforementioned nozzle group, A determination means to determine the nozzle which should carry out a regurgitation drive in the nozzle which constitutes the aforementioned nozzle group, A concentration compensation means to acquire the aforementioned record concentration corresponding to the nozzle determined that a regurgitation drive should be carried out from the aforementioned concentration table, and to perform the compensatory control of record concentration to the aforementioned determination means based on the acquired record concentration with the aforementioned determination means, It has an output means to output the data in which the nozzle determined that a regurgitation drive should be carried out by the aforementioned determination means is shown as data for a record drive.

[0019] Furthermore, the information processor by this invention for attaining the above-mentioned purpose is equipped with the following composition. Namely, the nozzle group which consists of two or more nozzles corresponding to the ink of the same kind It is the information processor which generates the data for a record drive of ** for the recording device which records using the recording head which two or more kinds of ink was made to correspond, and it had by the dot formed in two or more kinds of ink in one pixel. A storage means to store the concentration table showing the record concentration recorded in the ink breathed out from each of the nozzle which constitutes the nozzle group about at least one nozzle group of two or more nozzle groups with which the

aforementioned recording head is equipped, A determination means to determine the nozzle which should carry out a regurgitation drive out of the nozzle of two or more aforementioned nozzle groups based on image data about the pixel which should be recorded, A calculation means to acquire the aforementioned record concentration corresponding to each of the nozzle determined that a regurgitation drive should be carried out with reference to the aforementioned concentration table with the aforementioned determination means, and to compute the record concentration of the pixel concerned, A concentration compensation means to perform the compensatory control of record concentration to the aforementioned determination means based on the aforementioned record concentration of the pixel computed with the aforementioned calculation means, and the record concentration by which record of the pixel concerned shown by the aforementioned image data should be made, It has an output means to output the data in which the nozzle determined that a regurgitation drive should be carried out by the aforementioned determination means is shown as data for a record drive.

[0020] Moreover, according to this invention, the control method of the above-mentioned ink-jet recording device and the information processing method by the above-mentioned information processor are offered.

[0021]

[Embodiments of the Invention] Hereafter, the suitable operation form of this invention is explained with reference to an attached drawing.

[0022] The side elevation (A view view of drawing 1), drawing 3 , and drawing 4 of the perspective diagram and drawing 2 which show the important section (Records Department) of the ink-jet recording device according [[operation form of ** 1st] drawing 1] to this invention are partial detail drawing. In drawing, the sheet with which 501 has a picture recorded, 502, 503 and 504, and 505 are rollers which become a pair and convey a sheet 501 in the direction of X, respectively. The bulge section 506 is partially formed in the roller 505, and the bulge section 506 contacts a sheet 501. It is the pulley with which 507 was

attached in the motor and 508 was attached in the motor shaft. 509 and 510 are the pulleys attached in the end of rollers 502 and 504, respectively, it is combined with the pulley 508 with the belt 511, and rollers 502 and 504 rotate by rotation of a motor 507. Moreover, rollers 503 and 505 are energized in the direction forced on rollers 502 and 504 by the mechanism in which it does not illustrate, and convey a sheet 501 in the direction of X by the above composition.

[0023] 512 is the carriage which carries two or more head 513a-513l. (drawing 3), and as shown in (a) of drawing 4 , many nozzles (nozzle group) turn to a sheet side, and it is prepared in each head. 516 and 517 are the shafts held possible [sliding of carriage], and 516 has the structure where the amount of [which penetrated the hole 518 (drawing 2) established in carriage 512, and was prepared in carriage 512 / 519 (drawing 2)] height rides on a shaft 517. By the above composition, the field in which the nozzle of a head 513 was prepared faces a sheet in the predetermined distance d.

[0024] 520 is the belt fixed to carriage 512 in the part, and has combined between the pulleys 524 attached in the pulley 522 and the fixed shaft 523 which were attached in the shaft of a motor 521 possible [****]. By the above composition, carriage can move to the position of 512a and an object about 512a and the sheet which movement to the direction of Y and its opposite direction is possible, and are the direction whole region of Y of a sheet, and the position in readiness of carriage by rotation of a motor 521. In addition, during movement of on a sheet, the interval of a nozzle side and a sheet is constituted so that it may be maintained at d.

[0025] 526a-526l., it is the ink cartridge which put in ink, and Heads 513a-513l. are equipped, and ink is supplied to a head. A head cartlidge 526 can supply ink by removing and attaching a new ink cartridge, if attachment and detachment are free and the ink of an ink cartridge is lost to a head 513. 12 kinds of ink cartridges are prepared. the items differ in concentration in an order from 526a in two kinds of cyano shades, two kinds of Magenta shades, two kinds of yellow shades, and black ink -- six kinds come out In addition, it is good in an order from a also as

two kinds of red shades, two kinds of green shades, and two kinds of blue shades instead of being with these ink.

[0026] Head 513 a-l can be equipped now with such different ink cartridge 526 a-l, respectively. 525 is the sheet guide prepared between a roller 502 and 504 (drawing 2). many pinholes are prepared in the field which touches the sheet 501 of the sheet guide 525, and air suction is carried out from the lower part of drawing 2 by means by which it does not illustrate -- having -- suction force -- a sheet 501 -- the sheet guide 525 -- sticking -- a sheet -- **** -- it has prevented going up When a sheet comes floating, it becomes impossible to maintain d naturally and a sheet may collide with a head. 515 is a dot formed on the sheet 501 at the time of breathing out ink from each nozzle on a sheet 501 by the above composition.

[0027] 527 shown in drawing 2 is a concentration sensor, and is used for the density measurement of each field of a test pattern shown by below-mentioned drawing 5 formed on the sheet 501.

[0028] In addition, a reflected type sensor is sufficient as the concentration sensor 527, and a penetrated type sensor is sufficient as it. In the case of a penetrated type sensor, the luminescence section will be prepared in either the position of 527, and the position of 527 and the position of the opposite side which sandwiched the sheet 501, and the light-receiving section will be prepared in another side. When sheets 501 are reflected type media, concentration is measured by the reflected type sensor. Moreover, in the case of penetrated type media, concentration is measured by the penetrated type sensor.

[0029] Drawing 5 is drawing showing the example of record of a test pattern. On a sheet 501, the ink-jet recording device of drawing 1 is used, and a test pattern as shown in drawing 5 is recorded. 530a-530l. are 513a-513l., respectively, and is the field which carried out record (it records without piling up using all nozzles) 100%. Thus, while once returning the recorded sheet to the direction of X, and an opposite direction and conveying a sheet in the direction of X at a fixed speed again, the concentration of a test pattern record section is read by the

concentration sensor 527. Or while sending into the head section again the sheet which performed test pattern record and conveying a sheet in the direction of X at a fixed speed, the concentration of a test pattern record section is read by the concentration sensor 527. Or the concentration of the test pattern record section on the sheet which performed test pattern record is read by the concentration sensor of the equipment exterior. In addition, the scanner of every exception may be used after printing besides the above, and concentration may be measured. In this case, it is necessary to send the data read with the scanner to a printer.

[0030] Drawing 6 is drawing showing an example of the read concentration data. The concentration data reading result for a position field is shown, a vertical axis reads concentration D and a horizontal axis expresses a position with drawing 6 . L in drawing corresponds to the width of face of the band recorded by L of drawing 5 , i.e., all the nozzles of one nozzle group. By dividing length L by the number of nozzles in drawing 6 , the concentration D corresponding to each nozzle location is obtained, this is made into the numeric value of a stage predetermined by the predetermined threshold, and it stores in concentration table 104c (after-mentioned) which prepared this independently.

[0031] Drawing 7 is a block diagram explaining the example of the image processing system in this operation gestalt for creating the bit plane for piling up and recording two or more ink in which concentration differs on the same pixel. Moreover, drawing 8 is drawing explaining the flow of the image processing by the image processing system shown in drawing 7 .

[0032] As this image processing system is shown in drawing 7 , the picture input section 101 and a control unit 102, CPU103 which controls processing, and the storage 104 which stores the program which operates equipment, and various tables, RAM105 used as a work area of the various programs in a storage, The image memory 106 which stores an input picture, and the image-processing section 107 which makes image data binary, The bit plane memory 108 which stores the image data made binary, It consists of the printing sections 109 (it has the composition of drawing 1 - drawing 4) which perform image formation by the

ink-jet method according to the data stored in the bit plane memory 108, and connects by the bus line 110 which transmits an address signal, data, a control signal, etc., respectively. Gamma correction coefficient table 104a, ink overprint combination table 104b, and every nozzle concentration table 104c and 104d of control program groups are stored in the storage 104. About these functions, I will become clear by the below-mentioned explanation.

[0033] Hereafter, binary-ized processing of the image data based on the image-processing section 107 is explained using drawing 7 and drawing 8 . First, the case of the monochrome picture which uses only the ink of monochrome is explained. In addition, although constituted at the dot by which one pixel was piled up and recorded on the same point for the simplification of explanation, when it constitutes one pixel from a dot piled up and recorded on two or more adjoining points by the following explanation, it will be understood that it can completely process similarly.

[0034] The gamma correction processing 111 changes into the signal CD showing concentration the picture signal valve flow coefficient (CodeValue) inputted in the picture input section 101 using gamma correction translation table 104a, and stores it in image memory 106. The attention pixel selection 112 chooses from this in image memory 106 1 pixel which is going to carry out processing, and obtains the concentration data CD.

[0035] The ink distribution processing 113 chooses the ink combination corresponding to the concentration data CD value acquired by the attention pixel selection 112 with reference to ink overprint combination table 104b. The selection method is performed as follows.

[0036] The ink used by the recording head of this operation gestalt is shown in the following table 1.

[0037]

[Table 1]

種類	#1	#2	#3	#4	#5	#6
染料濃度	0.125	0.25	0.5	1	2	3.88
透過濃度	0.06	0.11	0.22	0.44	0.89	1.72

[0038] As shown in Table 1, the number of the ink used with this operation gestalt is six, and it is set to #1-#6 from the one where concentration is thinner at order. Moreover, the color concentration (%) of each ink and the transmittance factor density (record OD value) at the time of recording on a transparent record medium are shown in Table 1. In addition, each ink consists of a color and a solvent, and a solvent includes various additives, such as a surfactant and a moisturizer, in water. These additives control the regurgitation property from a recording head, and the absorption property on a record medium.

[0039] Under limit that set to a maximum of 4 the number of times of an overprint driven into the same pixel using the ink shown in Table 1, and the overprint of the ink of the same color concentration does not carry out, the number of gradation which can be expressed with one pixel is set to 6+15+20+15+1(6C1+6C2+6C3+6C4+1 (concentration 0)) =57. In addition, in Table 1, ink with the color concentration which cannot do combination which becomes the same concentration is set up. Moreover, the ratio of concentration of the color concentration for forming the independent ink dot at this time is about 1:2:4:8:16:32 from the low concentration side. And a picture is outputted using 53 gradation of this 57 gradation. That is, input image data (this example 256 gradation) is formed into 53 values, and a picture is outputted.

[0040] Drawing 9 is drawing showing an example of ink overprint combination table 104b. The kind and combination of the ink for expressing each gradation of 53 gradation mentioned above are stored in ink overprint combination table 104b. In addition, in drawing 9 , the column of No. shows each gradation. Moreover, the portion shown by * in drawing shows the combination which is not used in order to make it the difference of the concentration level in a low concentration portion become small as compared with a high concentration portion.

[0041] In the column of ink K#1 to K#6, it is shown that O carries out the regurgitation of the ink from a recording head, and x breathes out and twists the ink from a recording head, and shows things. Moreover, the transmittance factor density OD value which divided into 256 equally the range (here 0-3.27) of the transmittance factor density OD which shows the concentration data CD value corresponding to gradation level (53 level) in the column of dl (i) and a (i=0-52:integer), and which can be expressed in addition to the concentration data CD value of 256 gradation corresponds. Moreover, th(i) (i=0-52: The column of integer) shows the threshold for determining input image data as one gradation of 53 gradation. In addition, the concentration data CD value of the middle point between the gradation level dl (k-1) of a concentration data CD value and the gradation level dl of a concentration data CD value (k) is usually used for the threshold.

[0042] In ink overprint combination table 104b, the combination of the kind of ink to which O mark of each gradation was given is the combination of the ink overprint for expressing the gradation. And according to the combination of this overprint, the binary signal and dl-d6 which show the regurgitation and the non-regurgitation about the ink of each concentration are determined by the ink distribution processing 113.

[0043] In drawing 8 , the binary signals d1-d6 obtained as mentioned above are again transmitted to buffer memory 114. In buffer memory 114, whenever the binary data sent 1 bit at a time are sent in it, a bit shift is carried out, and if the amount accumulation of conventions is carried out, the content will be transmitted to the bit plane memory 108. That is, when the bus width of face of the bit plane memory 108 is 8 bits, whenever data are accumulated by 8 bits at a buffer 114, data are transmitted to the bit plane memory 108, and plain data are stored in a different address field for every bit plane one by one.

[0044] On the other hand, in the concentration error calculation 115, the transmittance factor density OD at the time of printing with the nozzle used in the overprint combination of the ink determined by the ink distribution processing 113

with reference to concentration table 104c the whole nozzle when printing an attention pixel is totaled.

[0045] Drawing 10 is drawing showing the example of concentration table 104c the whole nozzle. In drawing 10 , the leftmost train shows the number of the nozzle in each head. In this example, 256 nozzles are in one head. Moreover, the 1st line shows the design value of the transmittance factor density OD at the time of the number (513a-513l. of drawing 3 having shown) of a head and the 2nd line breathing out the kind of ink, and the 3rd line making each head to each ink breathe out from a top, and forming 1 dot in 1 pixel. And the actual measurement of the transmittance factor density OD value at the time of recording with the nozzle corresponding to the place where these lines and a train cross is filled in. Since the nozzle for recording the pixel is specified when it is decided that the kind of ink to be used will be an attention pixel, with reference to concentration table 104c, the transmittance factor density OD value at the time of printing with the nozzle actually used is computed this whole nozzle.

[0046] When totaling two or more concentration in ink, according to the regurgitation and non-regurgitation signal which were developed by buffer memory 114 about the attention pixel according to the ink overprint combination determined in the above-mentioned process, the transmittance factor density OD value of the nozzle to be used is acquired from concentration table 104c the whole nozzle, and is totaled.

[0047] Subsequently, according to the following formula to which OD value and CD value are made to correspond, OD value is changed as a record CD value (CD value corresponding to the actually recorded transmittance factor density).

Record CD value = a 255xOD value / 3.27= 255 (a 1-OD value / 3.27)

subsequently, the difference of concentration and CD value (request CD value) of an attention pixel -- delta is computed

a delta= request concentration data CD value 1 record CD value -- above -- carrying out -- the concentration error calculation 115 -- difference -- delta (concentration error) will be obtained

[0048] the difference computed by the concentration error calculation 115 in the error diffusion process 116 -- delta is diffused according to the distribution coefficient beforehand decided to be the circumference pixel of the attention pixel of image memory 106 The observed 1-pixel processing is completed by performing the above processing.

[0049] the above processing of 112 to 116 -- a basis [data / concentration / CD / of a picture] -- all pixels -- the bit planes d1-d6 of each ink-jet unit are formed in an address field different, respectively in the bit plane memory 108 by repeating a number

[0050] Drawing 11 is drawing showing notionally the memory operation of the bit plane generate time by the image processing shown in drawing 8 . The concentration data CD of the multi-gradation picture in image memory 106 are processed by the image-processing section mentioned above, and the bit plane for every ink-jet unit is generated by the bit plane memory 108.

[0051] That is, the binary data showing **** for every ink-jet unit generated to the concentration value of one certain attention image memory 106 pixel and non-**** are stored in the address in which a homotopic carries out pixel correspondence substantially with the attention pixel in the bit plane which separated for every ink-jet unit in the bit plane memory 108.

[0052] For example, when the concentration data CD value of an attention pixel is 125, this concentration data is changed into the binary data in which ink overprint combination table 104b shown in drawing 9 is referred to, and the regurgitation of ink and the non-regurgitation are shown in the binary-ized processing of the image-processing section 107 mentioned above. When concentration is 125, the gradation number 22 is chosen and the binary data 0, 1, 1, 1, 1, and 0 are stored in d1-d6 of buffer memory 114, respectively. And in case it is stored in the bit plane memory 108, the binary data 0, 1, 1, 1, 1, and 0 are stored in the attention pixel of the bit plane memory d1-d6 corresponding to each ink-jet unit, and a substantial homotopic, respectively.

[0053] When recording, a sheet 501 is sent in among rollers 502 and 503 from

the right-hand side of drawing by means by which it does not illustrate, by drawing 2 . Subsequently, a sheet is sent to a predetermined distance [every] intermittent target in the direction of X by the motor 507. While the sheet has stopped, a motor 521 rotates and carriage is moved in the direction of Y at a fixed speed. The nozzle regurgitation command signal corresponding to the picture signal is sent, and a drop is alternatively breathed out from each nozzle by the record control which the head on carriage mentioned above while passing through the sheet top according to this. While being in the position distant from on the sheet, a motor 507 moves a sheet in the direction of predetermined distance X, and stops, and a motor 507 moves a sheet at predetermined speed, and makes a drop for a head to pass through a sheet top and breathe out alternatively similarly again here. Finally by repeating this below, a desired picture is recorded on a sheet 501. The sheet which record ended is conveyed leftward [of drawing 2] with rollers 504 and 506, and, subsequently to the left of drawing 2 , is discharged with a conveyance means by which it does not illustrate.

[0054] As mentioned above, since according to the 1st operation gestalt it sets in heavy record of two or more kinds of ink constituting a pixel, the actual record concentration value in a nozzle unit is acquired and error diffusion process is given based on this, the difference in the property of each nozzle can be rectified and quality of image can be raised.

[0055] With the operation gestalt of the <modification> above 1st, although only the example of a monochrome picture was explained, in the case of a color, it can carry out similarly. That is, an input picture signal is changed into each color of C, M, and Y, the process of 112-116 of drawing 8 is performed about each color, and the binary signal of the regurgitation and the non-regurgitation is developed on the bit plane prepared for every head of each color. And in recording, it records by this binary signal.

[0056] Moreover, with the 1st above-mentioned operation gestalt, that one nozzle group (head) passes one pixel assumed only 1 time. however, a nozzle group passes one pixel -- 1 time -- not restricting -- multiple times -- the same nozzle

group may pass For example, in order to pile up the ink of the same concentration two or more times or, in order to make it hard to be visible in the nonuniformity of the joint of the bands (swath) recorded by the nozzle group In order to make it hard to be visible in the stripe generated under the influence of a kink when there is a kink (gap from the predetermined position of an impact position) of each nozzle It is one intermission or is the case where only L/2 and L/4 move without only L (width of face of the band which recorded L with all the nozzles of one nozzle group) moving a sheet. In such a case, the time of passing the time of passing to the 1st time to an one-pass eye and the 2nd time is made into two pass eye --. And a number of percent of the whole pixel is recorded by the one-pass eye, the remainder is recorded by the two pass eye, and the whole pixel is recorded with two paths. On which position it records by the one-pass eye determines beforehand. For example, as shown in drawing 12 (b), it is decided that the position of (1) is recorded on an one-pass eye, and the position of (2) is recorded on a two pass eye. Also in such a case, if the method of movement is decided beforehand, a use candidate's nozzle is specified for every path to a previous attention pixel.

[0057] With reference to drawing 12 and drawing 13 , it explains further. Drawing 12 (a) is the conceptual diagram of the swath of the example (two pass printing) which a sheet moves every [2 / L/]. When a sheet will be fixed and considered if a sheet moves L/2 upward after a part for a real line part is recorded by the one-pass eye, a head will move to down [of drawing] L/2 relatively. A two pass eye is printed in this position, and the swath shown with a dashed line is formed.

[0058] Drawing 13 is drawing explaining correspondence of the nozzle in at the time of performing two pass printing of drawing 12 . By drawing 13 , it is shown on account of explanation by the direction which looked at the head from the near side of space. That is, the pixel of the line recorded with the 80th nozzle by the one-pass eye is recorded with the 208th nozzle by the two pass eye as an example. Therefore, the nozzle to be used is specified if the kind of ink, the position of a pixel, and the order of a path are decided.

[0059] In this case, the buffer memory 114 and the bit plane memory 108 of drawing 8 prepare that from which only the number of paths differs about each ink, and fill in the binary signal of the regurgitation and the non-regurgitation about each nozzle used in order of a path. And in case it asks for the sum total of concentration, it is made to total about all paths in the concentration error calculation 115.

[0060] Moreover, after it was common, and it used buffer memory 114 and the bit plane memory 108 and being developed by the bit plane to two or more paths in another example, when actually printing, and data are alternatively taken out and printed out of a bit plane by the pattern decided beforehand and all paths are printed, all the pixels that are "regurgitation" by the bit plane 108 are made to be printed. In this case, in case it totals by the concentration error calculation 115, an attention pixel specifies about whether the nozzle of what position is used by what path eye, and it is printed, and uses the value of the concentration of the specified nozzle.

[0061] [Operation gestalt of ** 2nd] drawing 14 is drawing explaining the 2nd operation gestalt. This example is the so-called full multi-print method. That is, the heads 513a-513f which prepared the nozzle (nozzle group) of a large number which can convey a sheet 501 now by constant speed in the direction of X of drawing, and were prepared by conveyance means by which it does not illustrate, covering full [of the direction of Y of a sheet 501] are being fixed like illustration. And while a sheet 501 is conveyed in the direction of X, Heads 513a-513f perform image recording. Moreover, the concentration sensor 528 is formed covering full [of a sheet 501], and SHI by the nozzle and the record concentration of 501 can be measured now.

[0062] In addition, a penetrated type or a reflected type is sufficient as the concentration sensor 528. In a penetrated type case, the luminescence section or the light-receiving section is prepared in the position of 528, and it establishes another side in the position of 528, and the opposite position which sandwiched the sheet.

[0063] Like the 1st operation gestalt, only the nozzle of each nozzle group is used for the part on a sheet 501, and record is performed to it 100%. Drawing 15 is drawing showing the example of the test pattern in the multi-print method shown in drawing 14 . Since the concentration value of each nozzle will be acquired as it mentioned above by drawing 5 and drawing 6 if this test pattern is read by the concentration sensor 528, this is stored in concentration table 104c the whole nozzle.

[0064] By the case of such a multi-print method as well as the 1st operation gestalt, if an attention pixel is decided, a use candidate's nozzle to it will be determined. That is, since the relative-position relation between the position of a head for every scan and a picture was decided beforehand, when an attention pixel is decided, the nozzle (use candidate) used will be determined to each concentration. And with reference to ink overprint combination table 104b, the actually used nozzle is determined [from] among a use candidate's nozzles so that it may become the concentration value (CD value) which should record an attention pixel closely. And if the nozzle to be used is determined, the whole nozzle, with reference to concentration table 104c, the transmittance factor density value OD which will actually be recorded will be computed, and error diffusion process will be performed like the 1st operation gestalt.

[0065] as mentioned above, dispersion of the concentration value by the nozzle since error diffusion can be performed also in the ink-jet recording device of a multi-print method reflecting the concentration value for every nozzle according to the 2nd operation gestalt -- an amendment -- things are made

[0066] In addition, although a concentration table is prepared the whole nozzle about all the nozzle groups of two or more colors and two or more concentration and the compensatory control of record concentration is performed with the above 1st and the 2nd operation gestalt, it cannot be overemphasized that it can apply also to the recording device which has only the nozzle group of monochrome and single concentration (the ink distribution processing 113 shown in drawing 8 in this case becomes unnecessary).

[0067] Moreover, a concentration table is prepared the whole nozzle about the nozzle group chosen among two or more nozzle groups of two or more colors and two or more concentration, and it may be made to compensate record concentration. For example, in the composition which has [yellow / cyanogen, a Magenta, and] ink of six kinds of concentration about the ink of two kinds of concentration, and black, respectively, a concentration table is prepared the whole nozzle only about the nozzle group for blacks. In this case, about the nozzle of cyanogen, a Magenta, and yellow, the design value shown, for example in the 3rd line of drawing 10 is used, and dispersion for every nozzle is not taken into consideration. Thus, if constituted, high definition will be guaranteed in monochrome printing in black ink, for example, the suitable image recording for printing of a medical-application picture will be obtained. It is possible to offer required information on the other hand, since the resolution of human being's eyes falls, although concentration compensation for every nozzle is not performed about a color picture. Furthermore, since it is released from the concentration management for every nozzle, the amount of memory spent on a table etc. and a throughput can be reduced.

[0068] Moreover, with each above-mentioned operation gestalt, although the regurgitation signal to bit plane memory was developed within the ink-jet recording device, it does not restrict to this. For example, it carries out to an external device [which is connected to the ink-jet recording device concerned], for example, host computer which offers image data, side, and you may make it send the developed data to an ink-jet recording device.

[0069] Moreover, although error diffusion process was mentioned as the example with each above-mentioned operation form as concentration compensation, it is clear for it to be able to apply to other false halftone processings (for example, a dither method, a concentration pattern method, etc.).

[0070] In addition, even if it applies this invention to the system which consists of two or more devices (for example, a host computer, an interface device, a reader, a printer, etc.), you may apply it to the equipments (for example, a copying

machine, facsimile apparatus, etc.) which consist of one device.

[0071] Moreover, the purpose of this invention cannot be overemphasized by being attained by supplying the storage (or record medium) which recorded the program code of the software which realizes the function of the operation gestalt mentioned above to a system or equipment, and reading and performing the program code with which the computer (or CPU and MPU) of the system or equipment was stored in the storage. In this case, the function of the operation gestalt which the program code itself read from the storage mentioned above will be realized, and the storage which memorized the program code will constitute this invention. Moreover, being contained when the function of the operation gestalt which performed a part or all of processing that the operating system (OS) which is working on a computer is actual, based on directions of the program code, and the function of the operation gestalt mentioned above by performing the program code which the computer read is not only realized, but was mentioned above by the processing is realized cannot be overemphasized.

[0072] Furthermore, being contained, when the function of the operation gestalt which performed a part or all of processing that CPU with which the expansion card and expansion unit are equipped is actual, and was mentioned above by the processing is realized based on directions of the program code, after the program code read from the storage is written in the memory with which the expansion unit connected to the expansion card inserted in the computer or the computer is equipped cannot be overemphasized.

[0073]

[Effect of the Invention] according to [as explained above] this invention -- concentration dispersion for every nozzle -- an amendment -- things become possible and high-definition image formation becomes possible Furthermore, it sets for heavy record of two or more kinds of ink to constitute a pixel, and record a picture, concentration dispersion for every nozzle is rectified, and more nearly high-definition image formation becomes possible.

[Translation done.]

* NOTICES *

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the perspective diagram showing the important section (Records Department) of the ink-jet recording device by this operation gestalt.

[Drawing 2] It is the side elevation of the important section of an ink-jet recording device shown in drawing 1 .

[Drawing 3] It is drawing which can be set to the ink-jet recording device shown in drawing 1 and in which showing the carriage which carries two or more heads.

[Drawing 4] It is drawing explaining the head carried in the carriage shown in drawing 3 .

[Drawing 5] It is drawing showing the example of record of a test pattern.

[Drawing 6] It is drawing showing an example of the concentration data obtained from the test pattern shown in drawing 5 .

[Drawing 7] It is a block diagram explaining the example of the image processing system in this operation gestalt.

[Drawing 8] It is drawing explaining the flow of the image processing by the image processing system shown in drawing 7 .

[Drawing 9] It is drawing showing an example of ink overprint combination table 104b.

[Drawing 10] It is drawing showing the example of concentration table 104c the whole nozzle.

[Drawing 11] It is drawing showing notionally the memory operation of the bit plane generate time by the image processing shown in drawing 8 .

[Drawing 12] (a) is the conceptual diagram of the swath of the example (two pass printing) which a sheet moves every [2 / L/], and (b) is drawing showing the example of the record pixel position of an one-pass eye and a two pass eye.

[Drawing 13] It is drawing explaining correspondence of the nozzle in at the time of performing two pass printing of drawing 12 .

[Drawing 14] It is drawing explaining the ink-jet recording device by the 2nd operation gestalt.

[Drawing 15] It is drawing showing the example of the test pattern in the multi-print method shown in drawing 14 .

[Translation done.]

* NOTICES *

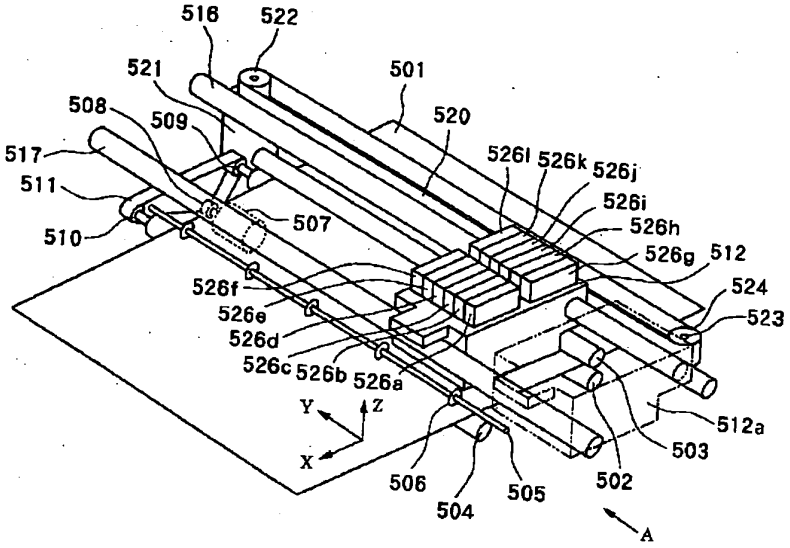
1.This document has been translated by computer. So the translation may not reflect the original precisely.

2.**** shows the word which can not be translated.

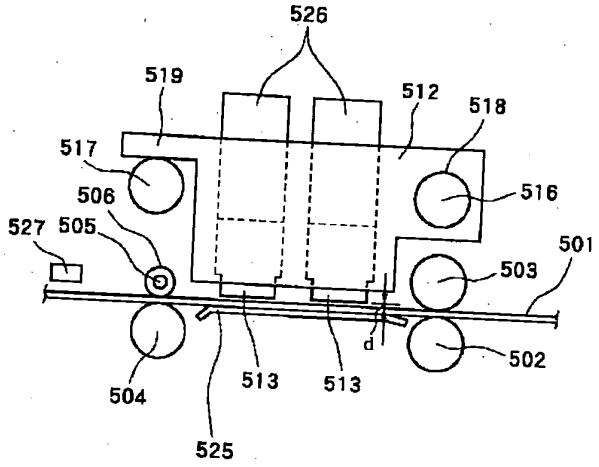
3.In the drawings, any words are not translated.

DRAWINGS

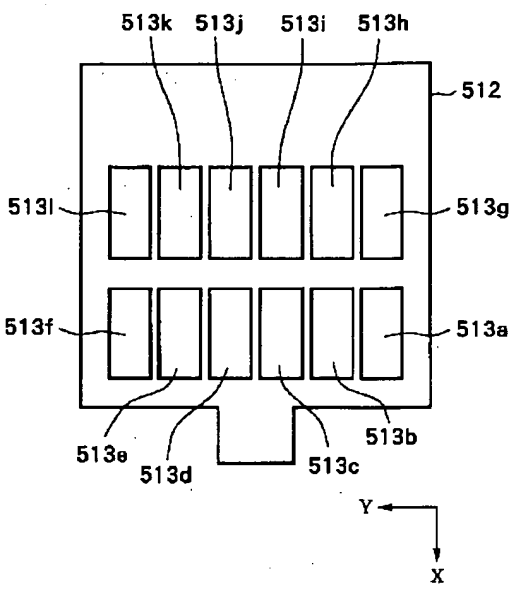
[Drawing 1]



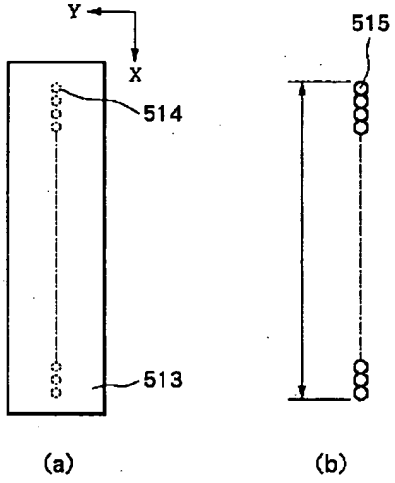
[Drawing 2]



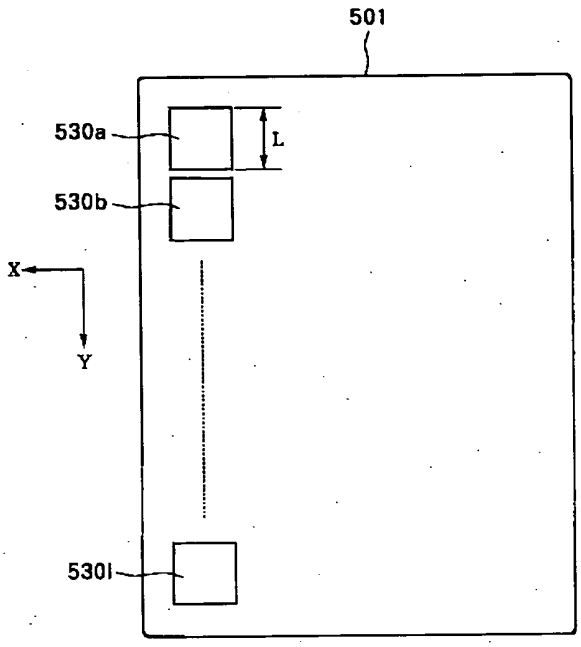
[Drawing 3]



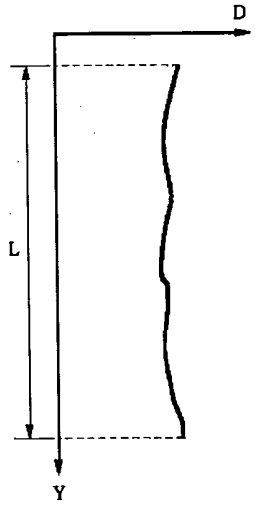
[Drawing 4]



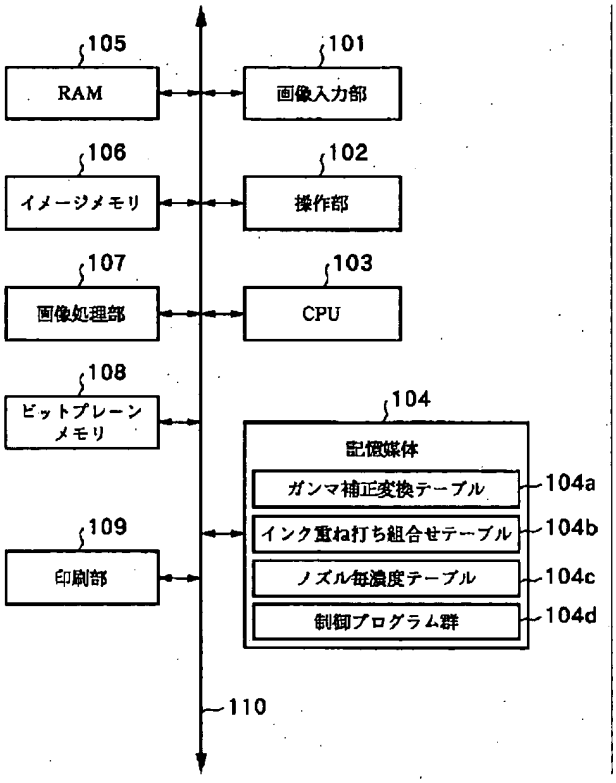
[Drawing 5]



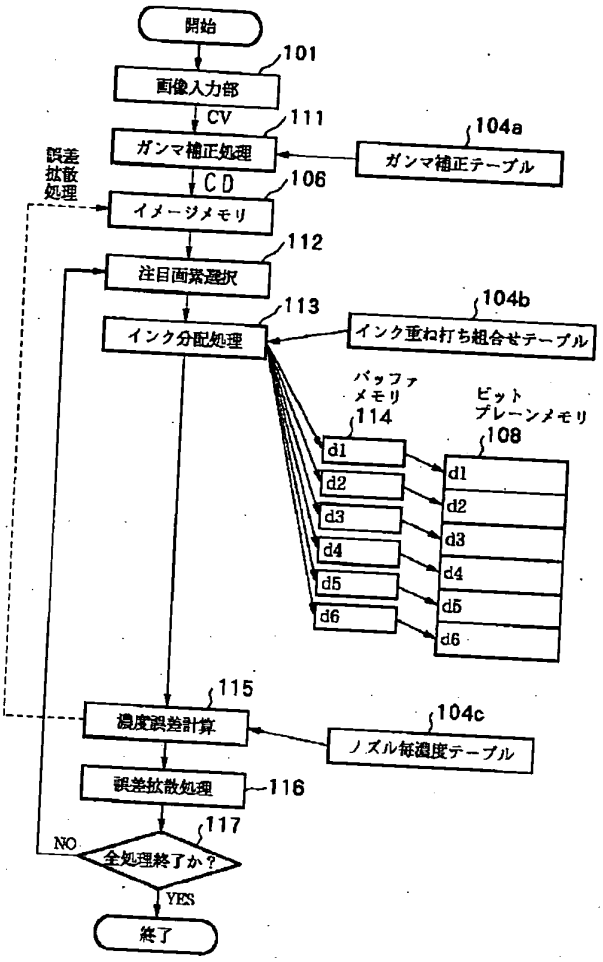
[Drawing 6]



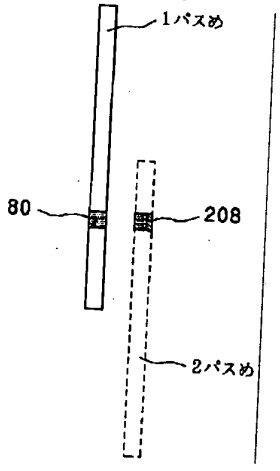
[Drawing 7]


105
RAM
101
画像入力部
106
イメージメモリ
102
操作部
107
画像処理部
103
CPU
108
ビットプレーンメモリ
104
記憶媒体
ガンマ補正変換テーブル
104a
インク重ね打ち組合せテーブル
104b
ノズル毎濃度テーブル
104c
制御プログラム群
104d
109
印刷部
110

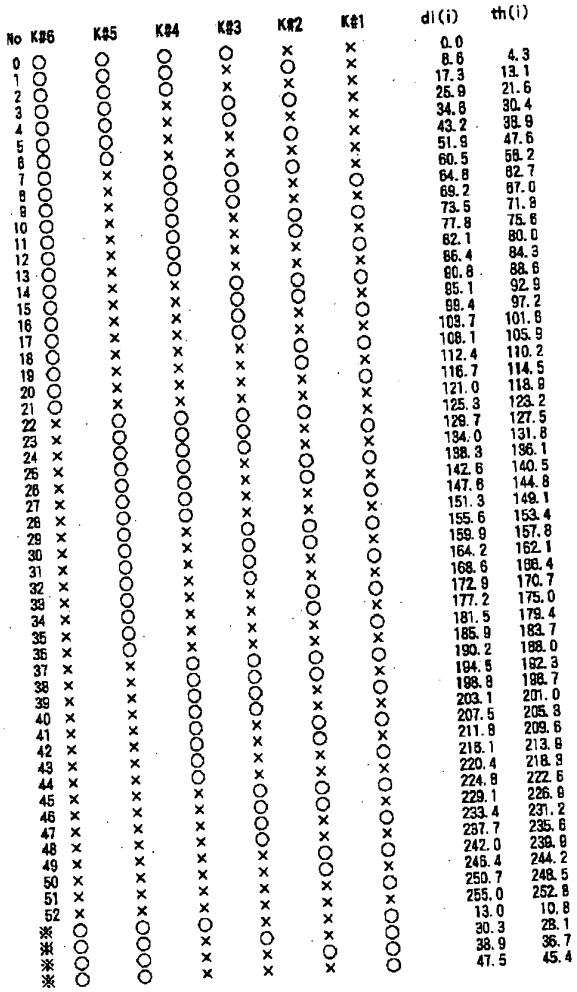
[Drawing 8]



[Drawing 13]



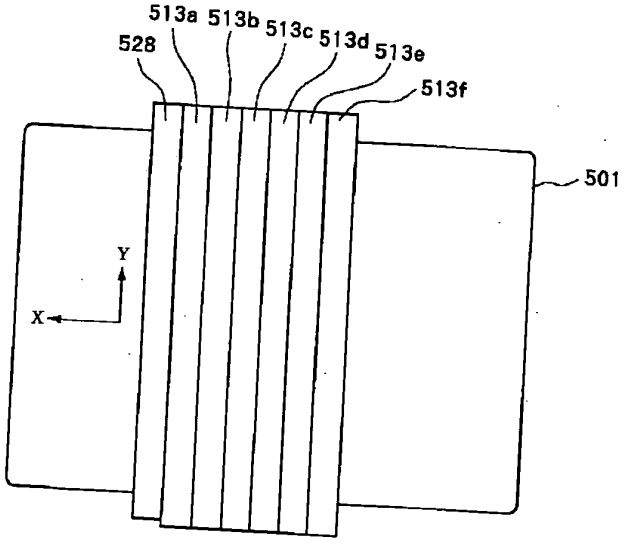
[Drawing 9]


No K#6 K#5 K#4 K#3 K#2 K#1 dl(i) th(i)
0.0
8.6 4.3
17.3 13.1
25.9 21.6
34.6 30.4
43.2 38.9
51.9 47.6
60.5 56.2
64.8 62.7
69.2 67.0
73.5 71.8
77.8 75.6
82.1 80.0
86.4 84.3
90.8 88.6
95.1 92.9
99.4 97.2
103.7 101.6
108.1 105.9
112.4 110.2
116.7 114.5
121.0 118.9
125.3 123.2
129.7 127.5
134.0 131.8
138.3 136.1
142.6 140.5
147.6 144.8
151.3 149.1
155.6 153.4
159.9 157.8
164.2 162.1
168.6 166.4
172.9 170.7
177.2 175.0
181.5 179.4
185.9 183.7
190.2 188.0
194.5 192.3
198.8 196.7
203.1 201.0
207.5 205.3
211.8 209.6
216.1 213.9
220.4 218.3
224.8 222.6
229.1 226.9
233.4 231.2
237.7 235.6
242.0 239.9
245.4 244.2
250.7 248.5
255.0 252.8
13.0 10.8
30.3 28.1
38.9 36.7
47.5 45.4

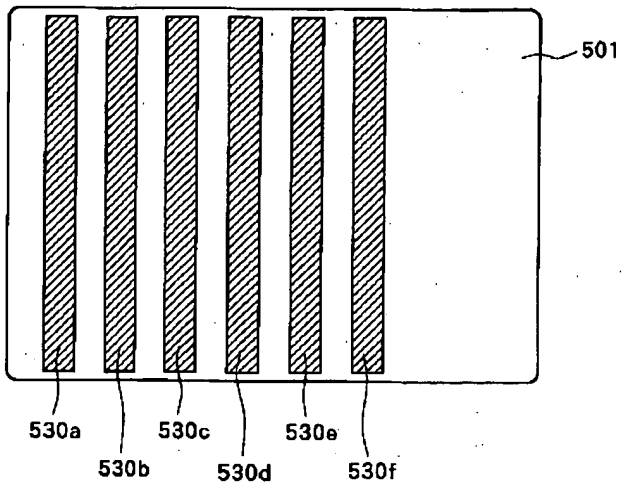
[Drawing 10]

	513a C#1	513b C#2	513c M#1	513d M#2	513e Y#1	513f Y#2	513g K#1	513h K#2	513i K#3	513j K#4	513k K#5	513l K#6
	0.8	1.6	0.8	1.6	0.8	1.6	0.06	0.11	0.22	0.44	0.89	1.72
1	0.82	1.63	0.8	0.6	0.78	1.6	0.06	0.11	0.23	0.46	0.9	1.7
2	0.82	1.63	0.8	0.61	0.78	1.6	0.06	0.11	0.23	0.45	0.91	1.71
3	0.82	1.63	0.8	0.6	0.79	1.6	0.06	0.11	0.23	0.46	0.9	1.7
4	0.82	1.62	0.81	0.6	0.79	1.6	0.06	0.11	0.22	0.45	0.91	1.7
5	0.82	1.63	0.8	1.61	0.79	1.6	0.06	0.12	0.22	0.44	0.9	1.71
6	0.82	1.62	0.81	1.61	0.8	1.6	0.06	0.11	0.22	0.43	0.89	1.72
7	0.82	1.62	0.8	1.6	0.8	1.6	0.06	0.12	0.22	0.43	0.91	1.72
8	0.82	1.62	0.79	1.61	0.8	1.6	0.06	0.11	0.23	0.45	0.92	1.7
9	0.82	1.61	0.79	1.61	0.8	1.61	0.06	0.12	0.22	0.46	0.92	1.7
10	0.82	1.61	0.79	1.61	0.8	1.61	0.06	0.11	0.23	0.46	0.91	1.71
11	0.82	1.62	0.8	1.62	0.8	1.61	0.06	0.12	0.22	0.46	0.9	1.71
12	0.82	1.62	0.8	1.62	0.8	1.61	0.06	0.11	0.23	0.47	0.88	1.72
13	0.82	1.61	0.8	1.61	0.8	1.61	0.06	0.12	0.22	0.45	0.88	1.71
14	0.82	1.61	0.81	1.61	0.79	1.61	0.07	0.11	0.23	0.45	0.87	1.72
15	0.82	1.61	0.81	1.61	0.8	1.61	0.06	0.12	0.22	0.45	0.9	1.73
16	0.81	1.6	0.8	1.6	0.8	1.61	0.06	0.11	0.22	0.44	0.9	1.73
17	0.81	1.59	0.8	1.59	0.79	1.61	0.07	0.11	0.21	0.44	0.92	1.73
18	0.81	1.59	0.8	1.6	0.8	1.61	0.06	0.12	0.22	0.45	0.92	1.73
19	0.81	1.59	0.81	1.6	0.79	1.6	0.06	0.11	0.22	0.45	0.91	1.73
20	0.81	1.6	0.81	1.6	0.8	1.6	0.07	0.11	0.21	0.44	0.9	1.73
21	0.81	1.6	0.81	1.59	0.8	1.6	0.06	0.12	0.22	0.44	0.87	1.73
22	0.81	1.6	0.81	1.59	0.8	1.6	0.06	0.11	0.22	0.45	0.88	1.73
23	0.81	1.61	0.81	1.61	0.8	1.61	0.07	0.11	0.21	0.45	0.9	1.73
24	0.81	1.61	0.81	1.61	0.8	1.61	0.06	0.12	0.22	0.45	0.92	1.73
25	0.81	1.6	0.8	1.61	0.8	1.6	0.06	0.11	0.22	0.45	0.91	1.73
26	0.81	1.6	0.8	1.61	0.81	1.6	0.07	0.12	0.2	0.45	0.88	1.73
27	0.81	1.6	0.81	1.6	0.81	1.6	0.06	0.12	0.21	0.45	0.87	1.73
28	0.81	1.6	0.81	1.6	0.81	1.6	0.06	0.12	0.21	0.45	0.9	1.73
...	...	...	...	...	...	...	...	...	...	...	...	...
233	0.79	1.61	0.81	1.62	0.79	1.59	0.06	0.11	0.21	0.45	0.91	1.72
234	0.79	1.61	0.81	1.62	0.79	1.59	0.06	0.11	0.21	0.44	0.89	1.72
235	0.79	1.62	0.8	1.61	0.79	1.59	0.06	0.1	0.2	0.44	0.91	1.71
236	0.79	1.62	0.8	1.6	0.79	1.6	0.06	0.11	0.21	0.43	0.89	1.7
237	0.79	1.62	0.79	1.62	0.79	1.6	0.06	0.11	0.21	0.43	0.9	1.69
238	0.79	1.63	0.79	1.63	0.79	1.6	0.05	0.11	0.21	0.43	0.9	1.7
239	0.8	1.63	0.8	1.63	0.79	1.6	0.05	0.11	0.21	0.44	0.91	1.7
240	0.8	1.63	0.8	1.62	0.79	1.6	0.06	0.1	0.21	0.44	0.87	1.7
241	0.8	1.63	0.8	1.62	0.79	1.6	0.06	0.11	0.21	0.44	0.88	1.69
242	0.8	1.63	0.8	1.6	0.79	1.6	0.05	0.11	0.21	0.44	0.89	1.68
243	0.8	1.62	0.81	1.62	0.8	1.6	0.06	0.11	0.21	0.44	0.92	1.68
244	0.8	1.62	0.81	1.59	0.8	1.6	0.05	0.1	0.21	0.44	0.92	1.7
245	0.8	1.62	0.8	1.61	0.8	1.8	0.06	0.11	0.21	0.44	0.88	1.72
246	0.81	1.63	0.81	1.62	0.8	1.8	0.05	0.11	0.21	0.44	0.89	1.71
247	0.81	1.62	0.81	1.62	0.8	1.6	0.06	0.1	0.21	0.44	0.91	1.71
248	0.81	1.62	0.81	1.62	0.8	1.6	0.06	0.11	0.21	0.45	0.88	1.71
249	0.81	1.63	0.8	1.63	0.8	1.6	0.06	0.11	0.21	0.44	0.87	1.71
250	0.81	1.62	0.8	1.62	0.8	1.6	0.06	0.1	0.21	0.45	0.89	1.71
251	0.81	1.62	0.8	1.62	0.8	1.6	0.06	0.11	0.21	0.44	0.91	1.71
252	0.81	1.62	0.81	1.62	0.8	1.6	0.06	0.11	0.21	0.45	0.9	1.71
253	0.81	1.63	0.81	1.62	0.8	1.6	0.06	0.1	0.22	0.44	0.9	1.71
254	0.81	1.63	0.81	1.62	0.8	1.6	0.06	0.11	0.22	0.45	0.92	1.71
255	0.81	1.63	0.81	1.63	0.8	1.6	0.06	0.11	0.23	0.44	0.89	1.71
256	0.81	1.63	0.81	1.63	0.8	1.6	0.06	0.11	0.23	0.45	0.89	1.71

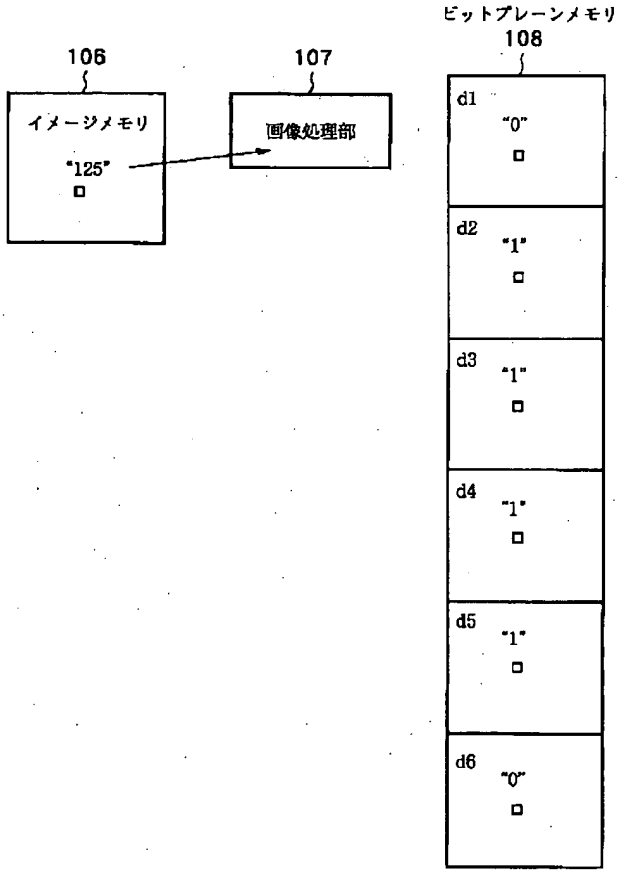
[Drawing 14]



[Drawing 15]

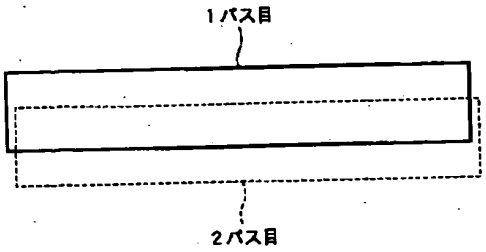


[Drawing 11]

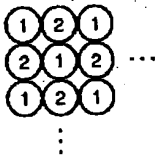


[Drawing 12]

(a)



(b)



[Translation done.]